Some of the numerical coincidences are very close, thus in the Uranian system, taking the distances to be 7λ, 10λ, 16λ, and 28λ, the first three satellites give $\lambda = 17600$, 17100, and 17600 miles respectively, (but the fourth satellite gives $\lambda = 13400$ miles).

He then states a second proposition: "Twice the unit of length in any system is approximately equal to that distance which corresponds to the period of rotation of the central body of that system," or say

$$\lambda = 1580\, M^{\frac{1}{3}} P^{\frac{2}{3}}$$

where M = mass of central body in terms of the mass of the earth, P period of the axial rotation in hours, λ in miles as before. It thus appears that dividing the value of λ for any system by the value of $M^{\frac{1}{3}} P^{\frac{2}{3}}$ for the central body of that system, the quotient should be 1580. For the Solar, Jovian, and Saturnian systems, the quotients are 1790, 1340, 1720, mean 1620. For the Earth $\lambda = 13100$ miles; so that regarding the Moon as a fourth satellite (the three interior ones missing) its theoretical distance is 210,000 miles. The paper concludes with some considerations as to M. Lescarbault's planet *Vulcan*.

Memorandum of Observations of Jupiter made during the month of April 1874. By John Brett, Esq.

I wish to call the attention of the Fellows to a particular feature of *Jupiter's* disk, which appears to me very well defined at the present time, and which seems to afford evidence respecting the physical condition of the planet.

The large white patches which occur on and about the equatoreal zone, and interrupt the continuity of the dark belts, are well known to all observers, and the particular point in connection with them, to which I beg leave to call attention is, that *they cast shadows;* that is to say, the light patches are bounded on the side farthest from the Sun by a dark border shaded off softly towards the light, and showing in a distinct manner that the patches are projected or relieved from the body of the planet.

The evidence which this observation is calculated to afford refers to the question whether the opaque body of the planet is seen in the dark belts or the bright ones, and points to the conclusion that it is not seen at all in either of them, but that all we see of *Jupiter* consists of semi-transparent materials.

The particular fact from which this inference would be drawn is, that the dark sides of the suspended or projected masses are not sufficiently hard or sharply defined for shadows falling upon an opaque surface, neither are they sharper upon the light background than upon the dark.

The laws of light and shade upon opaque bodies are very simple and very absolute; and one of the most rudimentary of them is, that every body has its light, its shade, and its shadow, the relations between which are constant; and that the most conspicuous and persistent edge or limit in this association of elements is the boundary of the shadow; the shadow being radically different from the shade in that its intensity is uniform throughout in any given instance, and is not affected by the form of the surface on which it is cast, whereas the shade is distinguished by attributes of an opposite character.

Now if the dark spaces adjoining the light patches on *Jupiter*, which I have called shadows, are not shadows at all, but shades, it is obvious that the opaque surface of the planet on which the shadows should fall is concealed; whereas if they are shadows, their boundaries are so soft and undefined, as to lead to the conclusion that they are cast upon a semi-transparent body, which allows the shadow to be seen indeed, but with diminishing distinctness towards its edge, according to the acuteness of its angle of incidence.

Either explanation of the phenomenon may be the true one, but they both lead to the same conclusion, viz., that neither the dark belts nor the bright ones are opaque, and that if *Jupiter* has any nucleus at all, it is not visible to us.

It is obvious that the phenomenon I have described would not be visible at the time of the planet's opposition, and the first occasion on which I noticed it was the night of the 16th of April last. The drawing* which accompanies this memorandum represents that particular observation; but since that date I have seen it even more distinctly on several occasions, and I venture to remark, that the time of opposition may prove to be as unfavourable for examining *Jupiter* as it is for the Moon.

The instrument used was a $9\frac{1}{4}$-inch silvered reflector, with achromatic eye-pieces; the power usually found most effective being 400.

By the kind invitation of Mr. Lassell, I had an opportunity on the 20th of April of examining the disk with his 20-foot reflector of 24 inches aperture, and I found this large instrument confirm my impressions concerning the shadows in the most satisfactory manner.

38 *Harley Street, W.*

Bright Spots on Jupiter. By Joseph Gledhill, Esq., F.G.S.

These curious and beautiful objects were finely seen here about midnight, April 23rd. They lay just within the shading which surrounded the south pole of *Jupiter*. Only three were seen. They seemed quite round, about the size of Sat. I., when fairly

* This drawing was exhibited at the Meeting.—Ed.